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CONTROL ID: 1188768
TITLE: Elemental Mercury Diffusion Processes and Concentration at the Lunar Poles
PRESENTATION TYPE: Assigned by Committee (Oral or Poster)
CURRENT SECTION/FOCUS GROUP: Planetary Sciences (P)
CURRENT SESSION: P16. Lunar Polar Volatiles

AUTHORS (FIRST NAME, LAST NAME): Frederick I Moxley[1, 2], Rosemary M Killen[2], Dana M Hurley[3]
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2. Planetary Magnetospheres, NASA Goddard Space Flight Center, Greenbelt, MD, United States.
3. The Johns Hopkins University Applied Physics Laboratory, Laurel, MD, United States.

Title of Team: DREAM

ABSTRACT BODY: In 2009, the Lyman Alpha Mapping Project (LAMP) spectrograph onboard the Lunar Reconnaissance Orbiter (LRO) spacecraft made the first detection of element mercury (Hg) vapor in the lunar exosphere after the Lunar Crater Observing and Sensing Satellite (LCROSS) Centaur rocket impacted into the Cabeus crater in the southern polar region of the Moon. The lunar regolith core samples from the Apollo missions determined that Hg had a devolatilized pattern with a concentration gradient increasing with depth, in addition to a layered pattern suggesting multiple episodes of burial and volatile loss. Hg migration on the lunar surface resulted in cold trapping at the poles. We have modeled the rate at which indigenous Hg is lost from the regolith through diffusion out of lunar grains. We secondly modeled the migration of Hg vapor in the exosphere and estimated the rate of cold-trapping at the poles using a Monte Carlo technique. The Hg vapor may be lost from the exosphere via ionization, Jeans escape, or re-impact into the surface causing reabsorption.

INDEX TERMS: [0328] ATMOSPHERIC COMPOSITION AND STRUCTURE / Exosphere.
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